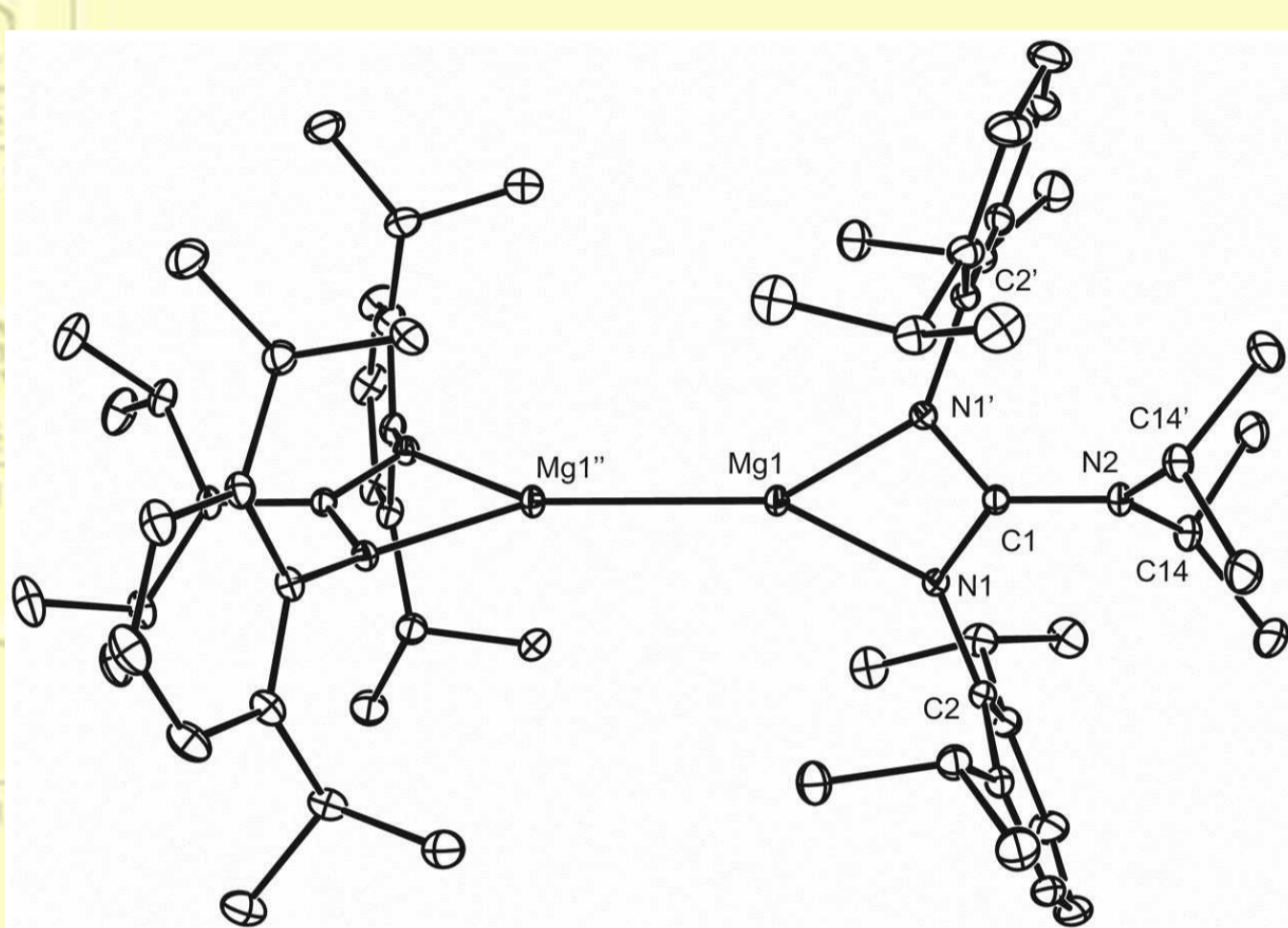


El Mg(I) s'aparella

Magnesium exists in all its known stable compounds in the 2+ oxidation state. Some Mg(I) compounds, such as HMgMgH, have been studied at low temperature. And the formation of the synthetically important Grignard reagent, RMgX, where R is an organic group and X is a halide, has been proposed to proceed through a Mg(I) intermediate, RMgMgX. But no examples of stable group 2 metal compounds in the 1+ oxidation state have been reported, until now.

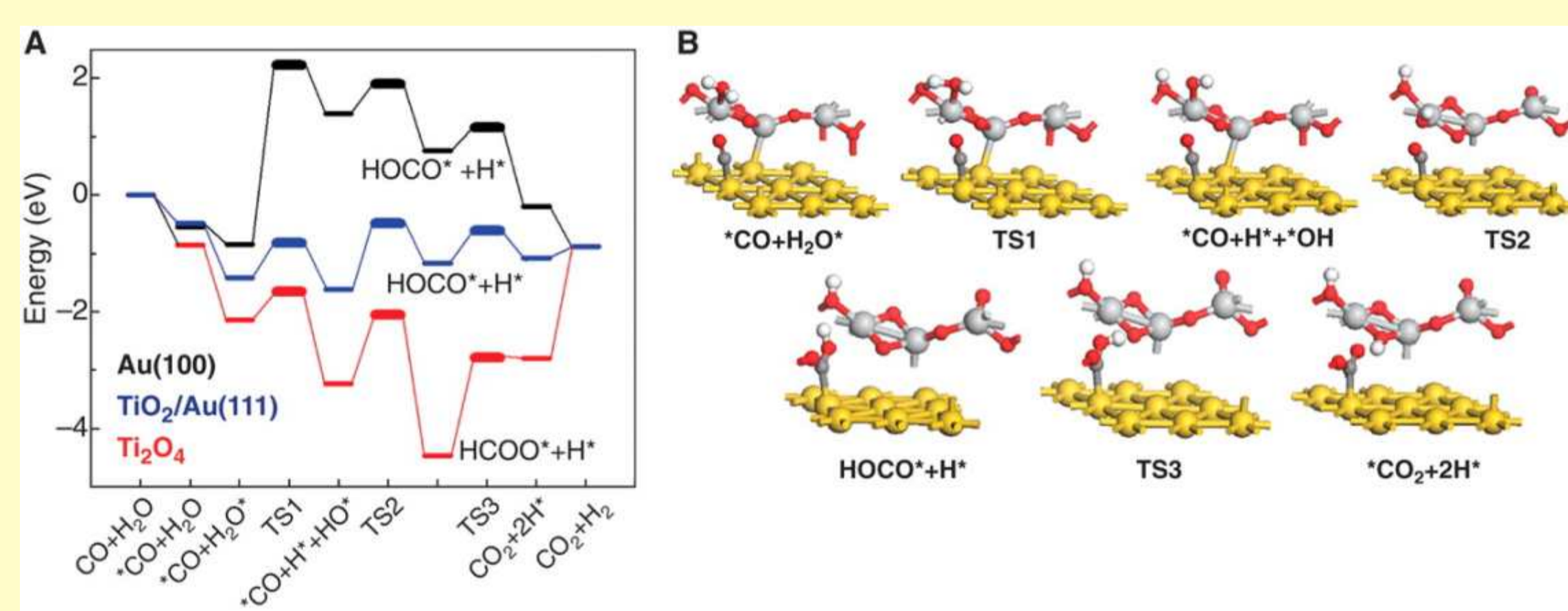
Shaun P. Green, Cameron Jones, and Andreas Stasch at Monash University, Victoria, Australia, used known dichromium chemistry and related dizinc chemistry as models in their attempts to make the dimagnesium compounds (Science, DOI: 10.1126/science.1150856). The researchers started with Mg(II) iodide precursors bearing N,N'-chelating ligands, either a guanidinate ligand or a diketiminate ligand, containing bulky diisopropylphenyl groups. They reduced the precursors using potassium metal to form the Mg-Mg compounds.



L'or trenca l'aigua

Brookhaven National Laboratory scientists have uncovered key pieces of the mechanism that drives the water gas-shift (WGS) reaction on gold/metal-oxide catalysts (J.A. Rodriguez *et al.*, Science, 2007, 318, 1757). Critical to industrial H₂ production, the WGS reaction (H₂O + CO → H₂ + CO₂) is used to remove the CO impurity from H₂ that's generated during reforming of crude oil, coal and other materials.

Conventional catalysts based on copper or iron-chromium complexes are air sensitive and require elaborate activation procedures before they can be used. Recent studies showed that novel WGS catalysts based on Au-CeO₂ and Au-TiO₂ nanomaterials may sidestep those problems, but the basic mechanism through which these catalysts mediate the reaction was poorly understood. Now, Jose A. Rodriguez and coworkers have determined that water dissociates at oxygen vacancies on the metal oxide surface and CO adsorbs at adjacent gold sites. Reactions then proceed at the interface between gold and the oxide.

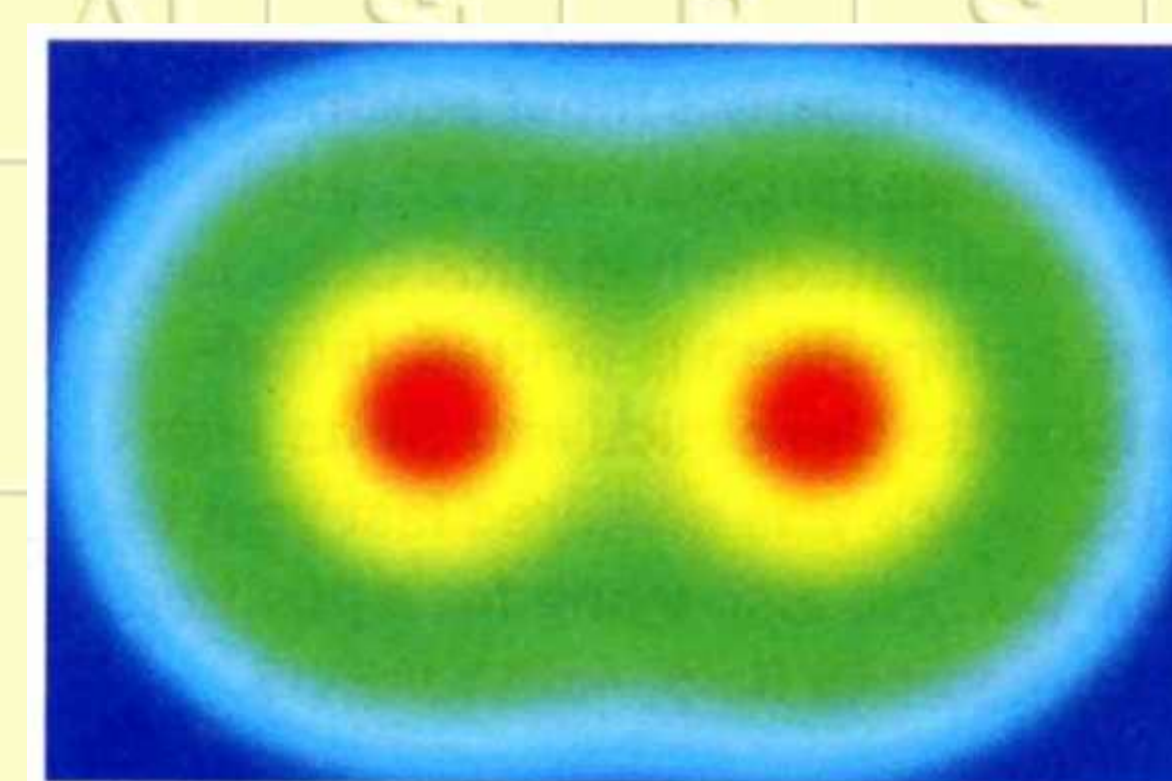


Dihidrogen sense protons: Ps₂

When an electron meets its positively charged antimatter counterpart, the positron, they've been known to briefly form an exotic "atom" known as positronium before annihilating each other within nanoseconds in a burst of gamma rays. Now comes an even more complex matter-antimatter entity: a molecule of two positronium atoms.

Positronium is somewhat analogous to hydrogen, with the positron playing the role of the proton. It even has a chemical symbol, Ps. Since the 1940s, scientists have speculated about the possibility of creating Ps₂ molecules.

Physicists D.B. Cassidy and A.P. Mills Jr. at the University of California, Riverside, finally orchestrated this marriage of opposites on the internal surface of a thin silica film (Nature, 2007, 449, 195). They collected positrons generated during the beta decay of sodium-22 and shot them onto the film, where the positrons linked up with electrons in the silica pores to form positronium. The energetics of the silica surface then allowed pairs of positronium atoms to bond, albeit briefly. Ps₂ exists for about a quarter of a nanosecond.

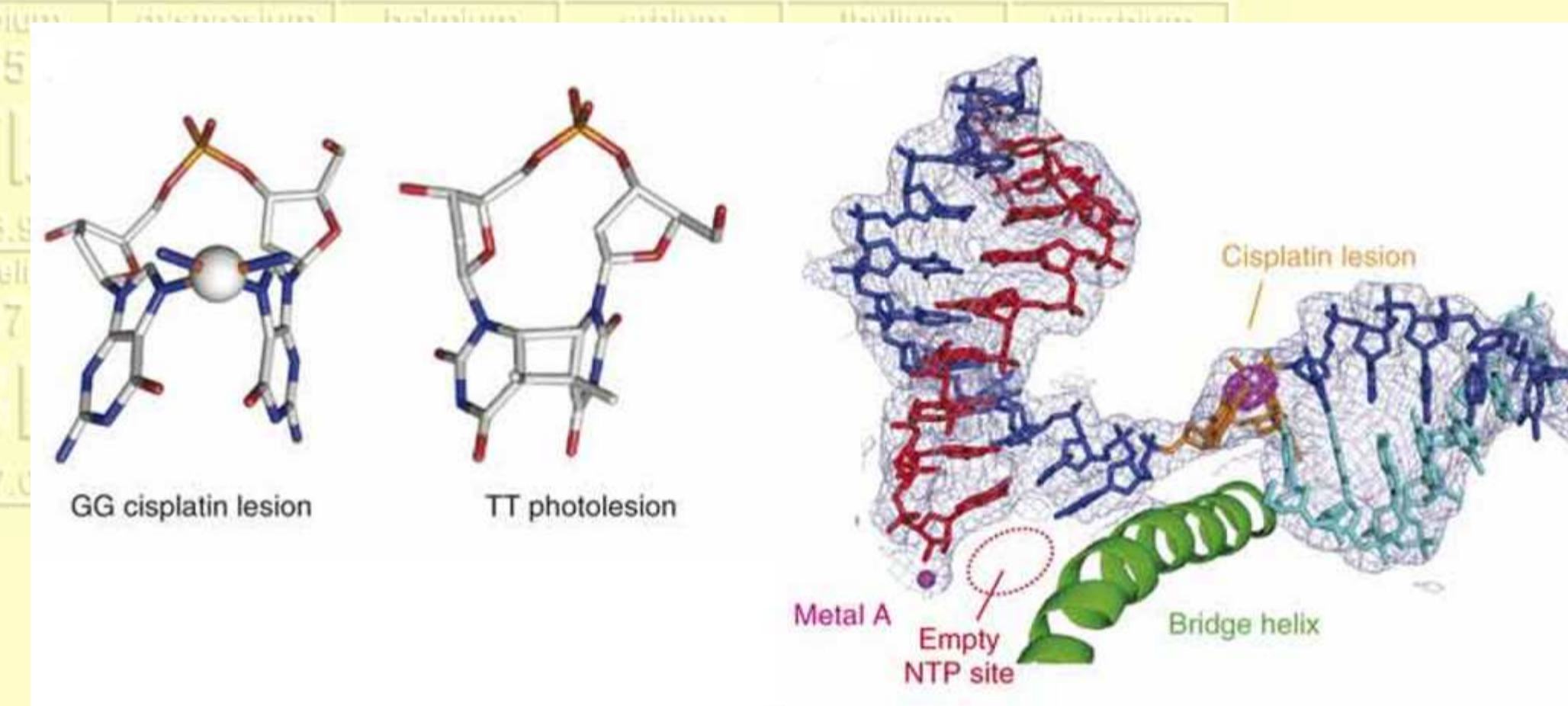


El cisplatí, enxampat

Cisplatin has been used to treat cancer for decades. But the drug's detailed molecular interactions with the enzymes it aims to interrupt have remained obscure. In two separate papers, researchers are now reporting the first crystal structures of cisplatin complexed with two key enzymes.

In one report, Thomas Carell and Karl-Peter Hopfner (University of Munich) announce the structure of a renegade DNA polymerase called Pol η . Normal DNA polymerases get stalled by cisplatin because their grip on DNA is so tight that there's no room for adduct riffraff. But Pol η manages to replicate over unwelcome DNA adducts. The new structure reveals that Pol η replicates over cisplatin adducts by having a much looser grip on DNA than other polymerases, allowing the adducts to fit into the catalytic site. The enzyme's catalytic site also has amino acids that help recruit bases for the cisplatin adduct (Science 2007, 318, 967).

A second reported crystal structure takes a step in that direction. Carell and Patrick Cramer, also at the University of Munich, show that transcription is blocked because cisplatin adducts cannot wedge themselves into the RNA polymerase catalytic site (Nat. Struct. Mol. Biol., 2007, 14, 1127).



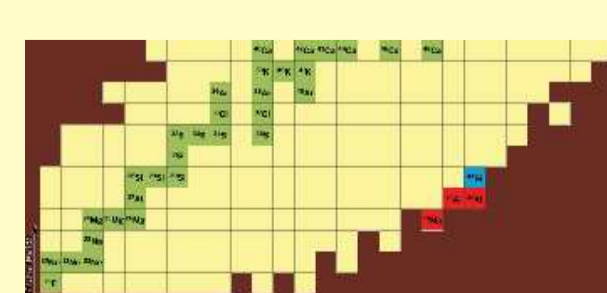
Breus



- Ha mort el Dr. Joan M. Coronas (Barcelona, 1912-2007), catedràtic i primer director (1966-1982) d'aquest Departament de Química Inorgànica.

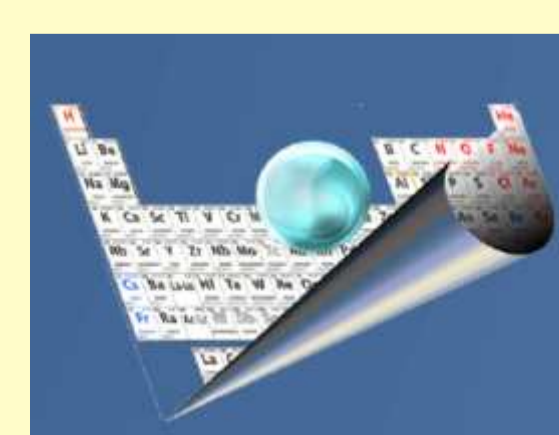


- Barrejant art i ciència, la mostra *Molecules that matter* itinera per diferents ciutats d'Estats Units. En aquesta exposició es presenten les 10 molècules més importants del segle XX des d'una òptica artística. Més informació: <http://tang.skidmore.edu/pac/mtm/>



- Recentment s'han preparat els isòtops ⁴⁰Mg i ⁴²Al, que tenen 14 neutrons més que els nuclis estables i permeten explorar els límits de l'estabilitat nuclear (T. Baumann *et al.*, Nature 2007, 449, 1022).

Avui recomanem



La Societat Catalana de Química ha organitzat un acte d'homenatge a D.I. Mendeleiev, amb motiu del centenari de la seva mort. L'acte tindrà lloc el 6 de febrer a la tarda, a la Sala Prat de la Riba de l'Institut d'Estudis Catalans. Més informació: <http://scq.iec.cat>

L'element



L'element número 37, Rubidi, fou descobert, mitjançant anàlisi espectroscòpica, per G. R. Kirchhoff i R.W. Bunsen l'any 1861 com a una impuresa del mineral lepidolita. El nom prové del mot llatí *rubidus* que vol dir *vermell intens*, degut al color de les seves línies espectrals. El mateix Bunsen el va obtenir per reducció de l'hidrogenatrat amb carbó. El seu preu molt elevat en comparació al potassi i al sodi, que tenen propietats molt semblants, fa que tant l'element com les sals no tinguin gaires aplicacions.